Preliminary Hurricane Michael Storm Recovery Plan
for Florida’s Beach and Dune System
Division of Water Resource Management
February 2019
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I. Introduction

Purpose

During the 2018 hurricane season, the State of Florida was impacted by two tropical storm systems and one major hurricane. The most significant impact to coastal areas resulted from Hurricane Michael in the Florida Panhandle. Hurricane Michael made landfall on October 10, 2018, as a strong Category 4 hurricane on the Saffir–Simpson hurricane intensity scale. The Department developed this Preliminary Hurricane Michael Storm Recovery Plan to address short and long-term beach recovery costs for the panhandle's most eroded beach and dune systems. This plan summarizes proposed management strategies and costs that incorporate ongoing federal, state and local efforts to restore the beach and dune systems that are vital to the health, safety and economic welfare of the State of Florida.

Summary of Impacts

Florida Department of Environmental Protection (DEP) damage assessment teams collected field data in Bay, Gulf, Franklin and Wakulla counties. Post-storm aerial photography provided by the National Oceanic and Atmospheric Administration (NOAA) assisted in the assessment of coastal conditions in these counties. Over 125 miles of Florida’s panhandle coastline were impacted by Hurricane Michael. Many of the impacted areas will require varying levels of recovery activities, ranging from natural recovery to dune restoration to full-scale beach nourishment. Many structures were damaged or destroyed, or are currently threatened due to the condition of the beach and dune systems in these counties.

Summary of Recovery Activities and Costs

This plan focuses only on the beach and dune systems in Bay, Gulf and Franklin counties that had moderate to major beach erosion. This report does not include replacement cost estimates associated with any upland structures, roads, piers, bridges or coastal armoring. The recovery of the beach and dune system is vital for providing essential environmental habitat for threatened and endangered species, and protection of upland development and infrastructure. The plan takes into account the strategies of the DEP Strategic Beach Management Plan (SBMP), where appropriate, to maintain long-term planning objectives. In some cases, projects that were already in the planning stages may be expedited as part of this recovery plan. In other cases, new projects and actions that were not part of a long-term plan will be required. Overall, the plan works to coordinate recovery efforts with long-term maintenance strategies,
using both regular program appropriations and emergency funding assistance provided by federal, state and local sources to achieve the most efficient recovery of impacted beaches and dunes.

In review of this recovery plan, it is important to understand that placing sand for emergency purposes may be a necessary beach management activity, but it is not the preferred strategy for managing and protecting Florida’s critically eroded sandy beaches. A preferred strategy for management of an eroded beach system is to implement a long-term protection plan, such as designing a beach restoration project and conducting routine periodic maintenance nourishments. This involves the initial dredging of sand from an offshore sand source or truck hauling sand from an upland mine for a restoration project followed by routine nourishments at specified multi-year intervals. In areas where this is not possible, the plan includes the construction of dune maintenance projects to expedite storm recovery and protection for upland development and infrastructure prior to the next hurricane season.

**II. Storm Impacts**

**Damage to Beaches and Dunes**

DEP staff conducted storm damage assessments on beaches impacted by Hurricane Michael and summarized the results in the Preliminary Hurricane Michael Post-Storm Beach Conditions and Coastal Impact Report. The counties that experienced moderate to major storm erosion to sandy beaches were in Bay, Gulf and Franklin counties. A summary of project locations and erosion conditions from post-storm site visits can be found in Table 1. An illustration of erosional conditions is provided in Figure 1. DEP staff created storm damage maps depicting beach and dune erosion conditions for the coastal impact report. The maps for Bay County (Figure 2), Gulf County (Figure 3), and Franklin County (Figure 4) are provided for reference.

The storm surge moved some sand from the beach and dune into upland areas landward of the beach, as well as to the nearshore area below mean low water due to wave action and retreat. Narrow beaches outside of restored project areas had significant erosion that, in some instances, undermined upland structures and roadways. It is expected there will be some natural recovery of these beaches as sand is gradually transported back to the beach from the nearshore areas. However, natural recovery will be slow and may not be sufficient to rebuild the dunes, subjecting upland structures and beach habitat to further risk. Some of these areas will require assisted recovery activities ranging from dune restoration to full-scale beach nourishment for protection of upland structures and infrastructure.
Table 1: Post-Storm Beach and Dune Erosion Summary

Bay County

<table>
<thead>
<tr>
<th>Locations</th>
<th>Reference Monuments</th>
<th>Erosion Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panama City Beaches</td>
<td>R0 – R91</td>
<td>I</td>
</tr>
<tr>
<td>St. Andrews State Park</td>
<td>R92 – R97</td>
<td>III-IV</td>
</tr>
<tr>
<td>Shell Island</td>
<td>R98 – V009</td>
<td>IV</td>
</tr>
<tr>
<td>Crooked Island</td>
<td>V009 – R127</td>
<td>IV</td>
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<tr>
<td>Mexico Beach</td>
<td>R127 – R144</td>
<td>IV</td>
</tr>
</tbody>
</table>

Gulf County

<table>
<thead>
<tr>
<th>Locations</th>
<th>Reference Monuments</th>
<th>Erosion Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beacon Hill</td>
<td>R1 – R13</td>
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</tr>
<tr>
<td>Windmark</td>
<td>R14 – R31</td>
<td>II</td>
</tr>
<tr>
<td>St. Joseph Peninsula, including State Park</td>
<td>R32 – R105</td>
<td>IV</td>
</tr>
<tr>
<td>Cape San Blas – west shore</td>
<td>R106 – R118</td>
<td>IV</td>
</tr>
<tr>
<td>Cape San Blas – east shore</td>
<td>R119 – R133</td>
<td>II</td>
</tr>
<tr>
<td>Indian Peninsula</td>
<td>R134 – R159</td>
<td>II</td>
</tr>
<tr>
<td>Indian Pass</td>
<td>R159 – R161</td>
<td>IV</td>
</tr>
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</table>

Franklin County

<table>
<thead>
<tr>
<th>Locations</th>
<th>Reference Monuments</th>
<th>Erosion Condition</th>
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</thead>
<tbody>
<tr>
<td>St. Vincent Island</td>
<td>V301 – V345</td>
<td>IV</td>
</tr>
<tr>
<td>Cape St. George Island State Preserve</td>
<td>R1 – R51</td>
<td>IV</td>
</tr>
<tr>
<td>St. George Island Plantation</td>
<td>R52 – R73</td>
<td>IV</td>
</tr>
<tr>
<td>St. George Island, including State Park</td>
<td>R73 – R148</td>
<td>IV</td>
</tr>
<tr>
<td>Dog Island</td>
<td>R150 – R192</td>
<td>IV</td>
</tr>
<tr>
<td>Alligator Point</td>
<td>R195 – R209</td>
<td>II</td>
</tr>
<tr>
<td>Southwest Cape</td>
<td>R209 – R217</td>
<td>III</td>
</tr>
<tr>
<td>Lighthouse Point to Bald Point</td>
<td>R217 – R239</td>
<td>II</td>
</tr>
</tbody>
</table>
Figure 1. Illustration of post-storm beach and dune erosion conditions.
Storm Damage Maps

Bay County

Figure 2: Bay County Beach and Dune Erosion Conditions from Hurricane Michael.
Figure 3: Gulf County Beach and Dune Erosion Conditions from Hurricane Michael.
Franklin County

![Map of Franklin County]

**Figure 4:** Franklin County Beach and Dune Erosion Conditions from Hurricane Michael.

**III. Beach and Dune Recovery Strategy**

The beach and dune recovery recommendations in this plan include volumetric loss determinations and replacement cost estimates that are based on the best available information and strategies. Some of the strategies may only include replacement of appropriate dune plants for stabilization of existing dunes or to conduct a sand search. DEP staff corresponded with federal, state and local agencies involved with storm recovery activities. Cost estimates were developed with the assistance of local sponsors and through supporting documentation provided by engineering consultants. These recommendations were developed as a guide to implement a recovery plan, and will, if implemented, accelerate the natural recovery of impacted beach and dune systems.
Each proposed activity is presented by county with a listing of DEP Reference (R) monuments, both in the text and on the associated maps, to identify project boundaries along the impacted shoreline. This recovery plan also identifies any known federal, state and local funds proposed to implement a project. The storm recovery funds indicated are required in addition to any funding currently appropriated for the Beach Management Funding Assistance Program or requested in the FY 2019-2020 Local Government Funding Request (LGFR). Detailed planning and engineering tasks will be needed for each project to formulate the most cost-effective design and construction. Any truck-haul projects in the below recommendations are estimated at $25 per cubic yard of sand. All properties where the State of Florida is the upland property owner are requested at 100 percent state cost. All other properties are requested at 50 percent state share. As of the drafting of this report, there are no known storm recovery projects included that qualify for public assistance funding provided by the Federal Emergency Management Agency (FEMA). This recovery plan is a supplemental planning document to the annual LGFR process and may require updates as additional information is received.

IV. Recommended Beach and Dune Recovery Plan

Bay County

- **Panama City Beaches Shore Protection Project, R1 – R92**
  Construct a full-scale beach nourishment project: The volume needed to nourish the full template including Hurricane Michael losses is 1,161,200 cubic yards estimated at $25 per cubic yard. Construction is anticipated to begin in FY 2020-2021. It is anticipated that the U.S. Army Corps of Engineers (USACE) will provide funding towards the scheduled federal nourishment.  
  
  *Estimated Total Cost: $30,000,000 (Estimated State Cost: $2,500,000)*

- **St. Andrews State Park Dune Project, R92 – R97**
  Construct a dune nourishment project: Storm losses are estimated at 26,700 cubic yards of sand within the park with an expected cost of $25 per cubic yard. State cost anticipates that the project could be constructed with the Panama City Beaches Shore Protection Project in FY 2020-2021.  
  
  *Estimated State Cost: $480,600 (State property at 100% state share)*
- **St. Andrews State Park Beach Project, R92 – R97**
  Construct a beach restoration project: As an alternative to the dune project above, this proposal will allow the state park to be restored to the same full-scale template as the Panama City Beach project, to improve project performance. A volume of approximately 600,000 cubic yards of sand, estimated at $25 per cubic yard, is predicted for restoration of the park. State cost anticipates that the project could be constructed with the Panama City Beaches Shore Protection Project in FY 2020-2021.
  
  *Estimated State Cost: $14,500,000 (State property at 100% state share)*

- **Mexico Beach Inlet, R127 – R128**
  Conduct a sand bypassing project: Bypass sand from the canal entrance and updrift beach by dredging sand and pumping it to the eroded beach areas downdrift of the canal.
  
  *Estimated Cost: To Be Determined.*

- **Mexico Beach Restoration, R128 – R144**
  Construct a full-scale beach restoration project: The volume needed to nourish the full template including Hurricane Michael losses is approximately 1,350,000 cubic yards estimated at $18 per cubic yard. Design of the full restoration for Mexico Beach has been initiated. Construction is planned in FY 2020-2021.
  
  *Estimated Total Cost: $24,300,000 (Estimate State Cost: $12,150,000)*

**Gulf County**

- **St. Joseph Peninsula Beach Nourishment, R77.3 – R85.5 and R89.5 – R105**
  Construct a beach and dune nourishment project: The beach nourishment project contractor was mobilizing for the construction phase when Hurricane Michael made landfall. A supplemental volume of 185,000 cubic yards of sand, estimated at $15 per cubic yard, is needed in addition to the planned nourishment for Hurricane Michael storm recovery. Construction is planned in FY 2019-2020.
  
  *Estimated Total Cost: $2,775,000 (Estimated State Cost: $1,387,500)*
• St. Joseph Peninsula Beach Nourishment – St. Joseph Peninsula State Park Extension, R67 – R71 and R72 – R77.3

Construct a beach and dune nourishment project: The project consists of an extension of the upcoming nourishment from the state park boundary into the state park to R67. The project includes placement of an additional 100,000 cubic yards of beach compatible sand and installation of sea oats to facilitate dune recovery. The estimated cost is based on $15 per cubic yard and $20,000 for sea oats.

Estimated State Cost: $1,520,000 (State property at 100% state share)

• St. Joseph Peninsula Beach Nourishment – William J. Rish Recreational Park Addition, R85.5 – R89.5

Conduct a beach nourishment project: The project is intended to mitigate for the extensive beach and dune losses and increase the performance of the planned nourishment project. The addition of the park will require 315,000 cubic yards estimated at $15 per cubic yard. The nourishment project is currently planned for areas north and south of Rish Park in FY 2020-2021.

Estimated Cost: $4,725,000 (State property at 100% state share)

• Michael’s Cut (Eagle Harbor), R71 – R72

Construct a beach project to fill the cut/breach and restore the dune: The project consists of placement of approximately 285,000 cubic yards of sand estimated at $15 per cubic yard.

Estimated State Cost: $4,500,000 (State property at 100% state share)

• St. Joseph Peninsula Beach Geotechnical Study, R67 – R105

Conduct a sand search study for the St. Joseph Peninsula Beach Nourishment: The current offshore borrow site may not produce the volume of sand needed for increased sand placement. The study will determine where other compatible sand sources are located.

Estimated Total Cost: $750,000 (Estimated State Cost: $375,000)
Beacon Hill/Windmark Dune Restoration, R1 – R31
Construct a dune restoration project: The project consists of the placement of approximately 200,000 cubic yards of beach compatible sand above the mean high water line. Estimated cost of $20 per cubic yard of sand is based on the assumption that the project will be constructed in conjunction with the Mexico Beach Restoration Project.

*Estimated Total Cost: $4,000,000 (Estimated State Cost: $2,000,000)*

Franklin County

- **St. George Island Plantation Dune, R52 – R73**
  Construct dune restoration: The project consists of truck haul and placement of 200,000 cubic yards of sand, estimated at $25 per cubic yard, above mean high water line to replace the estimated storm sand losses.

  *Estimated Total Cost: $5,000,000 (Estimate State Cost $2,500,000)*

- **St. George Island Dune, R74 – R105**
  Construct dune restoration at St. George Island where needed: The placement of 200,000 cubic yards of sand, estimated at $25 per cubic yard, above mean high water line to replace the estimated storm sand losses.

  *Estimated Total Cost: $5,000,000 (Estimate State Cost $2,500,000)*

- **St. George Island State Park, R105 – R128**
  Survey dunes for possible sand placement and plant dune vegetation.

  *Estimated Cost: To Be Determined (State property at 100% state share)*

- **Alligator Point, R210 – R216**
  Construct dune restoration at Alligator Point in areas where feasible and of greatest need. The placement of 200,000 cubic yards, estimated at $25 per cubic yard, is requested for storm repair.

  *Estimated Total Cost: $5,000,000 (Estimate State Cost $2,500,000)*
Summary of Recovery Activities

Currently, recovery activities consist of planning and coordination with federal, state and local authorities. Sand volumes have been estimated for Bay, Gulf and Franklin counties except for Mexico Beach Inlet and St. George Island State Park. Design and permitting activities will be the next step in the process to determine sand sources and construction plans. None of the projects listed in this report have constructed any post-storm beach or dune nourishment projects as of the published date of this report. This supplementary funding request coincides with the planning and coordination effort to assist DEP and local sponsors with the development of design and construction phases.

The total known storm recovery costs needed to implement the activities of this recovery plan are summarized in Table 2. Projects listed in this recovery plan are presented in Table 2, based on readiness to proceed in the upcoming fiscal years, with projects most ready to proceed listed first.
Table 2: Post-Hurricane Beach and Dune Recovery Plan Cost Summary

<table>
<thead>
<tr>
<th>County</th>
<th>DEP Reference Monuments</th>
<th>Project Name</th>
<th>Condition</th>
<th>Project Activity</th>
<th>Cubic Yards</th>
<th>Estimated Total Cost</th>
<th>Estimated State Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay</td>
<td>R1 – R92</td>
<td>Panama City Beaches Shore Protection Project</td>
<td>I</td>
<td>Beach Nourishment</td>
<td>1,161,200</td>
<td>$30,000,000</td>
<td>$2,500,000</td>
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<tr>
<td>Bay</td>
<td>R92 – R97</td>
<td>St. Andrews State Park Dune Project</td>
<td>III - IV</td>
<td>Dune Restoration</td>
<td>26,700</td>
<td>$480,600</td>
<td>$480,600</td>
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<tr>
<td>Bay</td>
<td>R92 – R97</td>
<td>St. Andrews State Park Beach Project</td>
<td>III - IV</td>
<td>Beach Restoration</td>
<td>600,000</td>
<td>$14,500,000</td>
<td>$14,500,000</td>
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<tr>
<td>Bay</td>
<td>R127 – R128</td>
<td>Mexico Beach Inlet</td>
<td>IV</td>
<td>Sand Bypassing</td>
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<td>Bay</td>
<td>R128 – R144</td>
<td>Mexico Beach Restoration</td>
<td>IV</td>
<td>Beach Restoration</td>
<td>1,350,000</td>
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<td>Gulf</td>
<td>R77.3 – R85.5 and R-89.5 – R105</td>
<td>St. Joseph Peninsula Beach Nourishment</td>
<td>IV</td>
<td>Additional Sand Required for Hurricane Michael Storm Losses</td>
<td>185,000</td>
<td>$2,775,000</td>
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<tr>
<td>Gulf</td>
<td>R67 – R71 and R72 – R77.3</td>
<td>St. Joseph Peninsula Beach Nourishment – St. Joseph Peninsula State Park Extension</td>
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<td>Beach Nourishment Extension</td>
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<td>Gulf</td>
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<td>Beach Nourishment</td>
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<td>$4,725,000</td>
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<td>Gulf</td>
<td>R71 – R72</td>
<td>Michael’s Cut (Eagle Harbor)</td>
<td>IV</td>
<td>Fill Cut and Construct Dune</td>
<td>285,000</td>
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<td>Gulf</td>
<td>R1 – R31</td>
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<td>Gulf</td>
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<td>Franklin</td>
<td>R52 – R73</td>
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<td>Dune Restoration</td>
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<td>Franklin</td>
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<td>R210 – R225</td>
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<td><strong>$102,550,600</strong></td>
<td><strong>$51,638,100</strong></td>
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*Note: Subtract the St. Andrews Dune Project or St. Andrew Beach Project from total and state costs based on which project is selected.*

| State Lands – 100% State Cost-Share
| Federal Shore Protection Project (USACE) with federal cost share
| TBD | Cost estimates are “To Be Determined” as more information is needed from the local government

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V. Implementation of Recovery Plan

This hurricane recovery plan contains implementation strategies involving the need for state, federal and local agency cooperation. Successful implementation of the plan will require extensive coordination to address multiple funding sources, potential impacts to nesting marine turtles and shorebirds, potential impacts to environmental resources and cost-effective designs. While the plan contains several short-term measures such as dune restoration to address immediate threats, it should be recognized that long-term implementation activities will continue for several years as beach restoration and maintenance nourishment activities are completed.

Each of the implementation strategies recommended in the plan will require coordination with state and federal resource agencies, such as the Florida Fish and Wildlife Conservation Commission and USACE. Many of the proposed measures will require state and/or federal permits. DEP has initiated meetings with the appropriate state and federal agencies to coordinate activities and will facilitate streamlined permitting, where feasible, to implement projects.